MASSACHUSETTS STATE SUSTAINABILITY PROGRAM
PUBLIC LEADERSHIP, STEWARDSHIP, COMMITMENT

Commonwealth of Massachusetts

Executive Office of Environmental Affairs

EXECUTIVE OFFICE of ENVIRONMENTAL AFFAIRS

State Sustainability
Program Activities Report
Fiscal Years 2002 thru 2004

February 2005

Mitt Romney, Governor
Kerry Healey, Lt. Governor
Ellen Roy Herzfelder, Secretary
Eric Friedman, Director

Contents

Executive Summary

About the State Sustainability Program

The State Sustainability Program at the Massachusetts Executive Office of Environmental Affairs (EOEA) was established by Executive Order in July 2002 to help state agencies reduce the environmental impacts of their operations, and to incorporate the principles of sustainability into state government. The Program and the State Sustainability Council provide guidance, technical assistance, funding, educational materials, and other resources to help "green" Massachusetts state government.

About this Report

This summary report provides a brief overview of the key activities and projects completed by the State Sustainability Program since the signing of E.O. No. 438 in July of 2002 through the end of fiscal year 2004 (June 30, 2004).

This report is not intended as a summary of all the sustainability activities occurring in the Commonwealth. Rather, only the projects and activities directly coordinated, funded, or managed by State Sustainability Program Staff and the Coordinating Council are described herein. Program staff intend to also prepare a broader report that will outline all the sustainability activities occurring in state agencies in Massachusetts.

This report was prepared by State Sustainability Program staff Eric Friedman, Director and Jaclyn Emig, Project Manager.

Program Highlights: July 2002 - June 2004

Note – Most cost savings and environmental benefit calculations included in this report are estimated based on general assumptions of product use as provided by the EPA, manufacturer information, or documented case studies. Please see Appendix II or contact Program staff for additional information.

I. Agency Projects: Projects and activities that were funded, coordinated, or managed by the Program.

Overall Cost Savings

- → Provided **$377,544** in funding for agency projects
- → Annual Cost Savings of **$246,030**
- → Average simple payback of **1.5 years**

Energy Efficiency and GHG Reductions

- → **138 tons** CO_2 emissions reductions
- → Annual cost savings of **$35,528**
- → Average simple payback of **1.8 years**

Recycling and Waste Reduction*

- → Increase recycling of mixed paper and cardboard by **760 tons**
- → Annual savings of **$208,761**
- → Average simple payback of **1.2 years**

**Note – includes documented results of the DOC recycling program, based on actual FY04 data*

Water Use Reduction

- → Potential to reduce water use by up to **1.6 million gallons** per year

II. Statewide Activities: Activities completed by the Program which have a wider impact than specific agency projects, such as measuring statewide environmental impacts, developing guidance and outreach materials, and providing training for agency staff.

- A comprehensive Agency Sustainability Guide outlining priorities, goals, and strategies for implementation
- FY02 Greenhouse Gas Inventory for State Government
- Statewide energy use baselines
- Agency Sustainability Plans for five agencies, based on the Plan Template designed by the State Sustainability Program
- Three training sessions for agency staff

Program Budget

The State Sustainability Program provides funding for small-scale agency sustainability projects, workshops, technical assistance, and other Program needs. Included below is a breakdown of Program spending, based on project type, for the period of May 2002 – July 2004.

State Sustainability Program Budget July 2002 – June 2004	
TOTAL	**$432,484**
I. Agency Projects	**$377,444**
GHG Emissions Reductions	$65,484
Recycling and Waste Reduction*	$247,511
Water Conservation	$26,979
Other	$37,615
II. Statewide Activities	**$55,040**
Agency Sustainability Guide	$3,396
GHG Emissions Inventory	$133
Planning Assistance	$23,500
Training*	$28,011
* Includes a project that was funded in FY02	

Program Staff

Please contact State Sustainability Program Staff at the Executive Office of Environmental Affairs (EOEA) if you have any questions on this report or would like additional information on any of the items included.

Website: http://www.mass.gov/envir/Sustainable/

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Section I. Agency Projects

Over the past two years EOEA has provided technical assistance, project coordination, and **$377,444** in funding to help more than 20 agencies implement projects designed to reduce agency environmental impacts and, in most cases, result in cost savings. Projects were prioritized based on the following factors:

- Environmental Benefits
- Cost Savings
- Innovative projects or technology
- Agency commitment to continue & expand the project
- High priority areas (Climate Change, Solid Waste, Water)

Summary of Agency Sustainability Projects included in this report

** Note – Savings are based on general estimates of product use*

Topic	Estimated Environmental Benefits	Total Cost	Potential Annual Savings	Estimated Payback (years)	Potential Lifetime Net Savings
1. GHG Emissions Reductions / Energy Efficiency	• Retrofits, vending misers, compact fluorescent light bulbs, LED exit signs • 138 tons of CO_2 reductions • Equiv. to 27 cars on the road • Projects at 10 agencies	$65,484	$35,528	1.8	$142,781
2. Solid Waste	• Recycling program technical assistance, compactors and balers, duplex printer units, recycling bins & signage • Increased recycling of mixed paper and cardboard by 973 tons • Estimated to save 11,481 trees • New or expanded recycling programs at 12 agencies	$247,366	$210,261	1.2	$773,498
3. Water	• Shower controls, waterless urinals, low-flow clothes washers, green landscaping • Save 1.6 million gallons / year • Projects at 4 agencies	$26,979	>$1,940	N/A	N/A
4. Other Projects	• Encapsulation of pressure-treated wood, Green cleaners, LEED training, thermometer exchange, clean outboard motors • Reduction in exposure to toxics, improved indoor air quality, reduction in disposal of mercury • Projects at 7 agencies	$37,615	N/A	N/A	N/A
	TOTAL	**$377,444**	**$247,522**	**1.5**	**$915,260**

1. Energy Efficiency and GHG Emissions

1.1 Electricity Audits and Retrofits at Small State Facilities (FY04)

In FY03 and FY04 the State Sustainability Program worked with three agencies, the Departments of Conservation and Recreation (DCR), Youth Services (DYS), and Mental Retardation (DMR), to initiate energy audits and retrofits at small-scale (<40,000 sq ft) facilities.

Estimated Benefits

GHG Reduction =
69 tons CO_2 per year

$ Project Life Savings (7-year) =
$90,563 (over 7 years)

Leveraged Utility Rebates =
$50,185

Simple Payback =
2.2 years

Facilities <40,000 sq feet were chosen because they generally are not large enough for inclusion in the Division of Capital Asset Management Energy Efficiency Program, and to take advantage of the 80% of project cost rebate opportunities available through the Small Commercial Energy Efficiency programs at the major utility companies. Energy audits were conducted at a total of ten facilities, selected based on electricity use, size, and building use to maximize savings.

Based on the results of the audits, each agency received funding to complete retrofits at the facilities with the best estimated cost savings and kWh reductions. The chart below includes the total project cost, dollar amount leveraged in utility rebates, total dollar cost to the agency, and cost and kWh savings estimated for each retrofit completed in fiscal year 2004.

Results

EOEA invested **$42,426**, leveraging **$50,185** in utility rebates for retrofits at 10 facilities. Results:

- Reduction of **69 metric tons** of CO_2
  - → Equivalent to removing **15 average cars** from the road for one year
- Electricity savings of **$18,998** per year and savings over **7 years of $90,563**

Summary Table of Costs and Potential Benefits

Note – Savings estimates are based on reports from energy savings companies

Agency	Total Project Cost	Utility Incentive	Agency Cost	Annual Savings ($)	Simple Payback	Project Life Savings (7 years)	Annual kWh Savings	Annual GHG reduction (tons CO_2)
DCR	$47,977	$29,337	$18,640	$6,143	3.0	$24,363	**60,992**	**25.2**
DYS	$29,019	$9,251	$19,768	$7,538	2.6	$32,998	**53,939**	**22.3**
DMR	$13,989	$11,597	$4,018	$5,318	0.8	$33,202	**53,154**	**21.9**
Total	**$90,985**	**$50,185**	**$42,426**	**$18,999**	**2.2**	**$90,563**	**168,085**	**69.4**

1.2 Energy Efficiency Statewide Campaigns (FY03 & FY04)

Working with the MA Environmentally Preferable Purchasing Program (EPP Program), EOEA initiated statewide energy efficiency campaigns, to promote simple, low-cost "action steps" to reduce energy consumption at state facilities. Agency staff were offered the opportunity to apply for small-scale energy efficiency equipment such as vending misers and screw-in compact fluorescent light bulbs.

Estimated Benefits

GHG Reduction = **68 tons CO_2** per year

$ Project Life Savings (5-year) = **$52,218** (over 5 years)

Simple Payback = **1.4 years**

Seven state agencies participated in the statewide Energy Efficiency "action step" campaigns in fiscal year 2004, including:

- Bureau of State Office Buildings
- Department of Conservation and Recreation
- Division of Career Services
- UMass Boston
- Chelsea Soldier's Home
- Department of Social Services
- Division of Unemployment Insurance
- UMass Medical Center, Worcester

Summary Table of Costs and Potential Benefits

Note – Savings estimates are based on general estimates of product use

Campaign	Equipment and/or Materials	Cost		Estimated Environmental & Economic Benefits
Vending Misers	**91 Vending Misers** at 6 participating agencies, which reduce the electricity load of soda and snack machines by 30-50%	$19,339		Annual electricity savings = **126,730 kWh** Annual GHG reductions = **52 tons CO_2**
			$	Annual savings = **$12,708** Lifetime (5 yr) Net Savings = **$40,501** Simple Payback = **1.5 years**
Compact Fluorescent Light Bulbs	**361 compact fluorescent bulbs** at 4 participating agencies 80 14 Watt bulbs 44 20 watt bulbs 237 24/26 watt bulbs	$1,787		Lifetime electricity savings = **158,717 kWh** Lifetime GHG reduction = **56 tons CO_2**
			$	Annual savings = **$3,481** Lifetime (5 yr) Net Savings = **$12,345** Simple Payback = **.5 years**
LED Exit Signs	Replacement of **28 inefficient exit signs** with efficient LEDs at Salem State College	$1,941		Annual electricity savings = **3,700 kWh** Annual GHG reduction = **2 tons CO_2**
			$	Annual savings = **$883** Simple Payback = **2.2 years**
TOTALS		**$23,058**		Annual GHG reductions = **68 tons CO_2**
			$	Annual $ Savings = **$16,530** Lifetime (5 yr) Net Savings = **$52,218** Simple Payback = **1.4 years**

2. Recycling and Waste Reduction

2.1 Recycling at State and Community College Campuses (FY03 & FY04)

In FY03 the EOEA State Sustainability Program contracted with recycling consultants to conduct site visits and make recommendations for increasing recycling, and reducing over-all solid waste costs, at 14 campuses. These reports are available for review on the EOEA website.

In response to the results in the reports, EOEA funded nine State and Community Colleges to expand existing or implement new recycling programs, focusing on mixed paper and cardboard recycling. The summary table below is an overview of the recycling projects, with estimated environmental and cost savings as identified in the site visit reports (actual results of the projects will not be available until FY05, and the tonnage and cost-saving numbers included below are based on the consultant analyses).

Recycling at State and Community Colleges

Potential Increased diversion = **760 tons** per year

Environmental Benefit = **8,963 trees** saved/year

$ Potential Life Savings = **$273,324 (over 5 years)**

Simple Payback = **1.1 years**

Summary Table of Costs and Potential Benefits

** Note – Savings estimates are based on results of site visit reports completed by recycling services consultants*

Campuses	Project Summary	Cost	Estimated Env. Benefits	Potential Cost Benefits
Cape Cod CC	Membership to the Institution Recycling Network (IRN)	**$750**	**Environmental Benefits for all campuses combined** Estimated to increase mixed paper and cardboard recycling by **760 tons** of, a **40% increase** Recycling an additional 760 tons of mixed paper and cardboard is estimated to save: = **8,963 trees**	**Estimated Cost Savings for all campuses combined** Potential Annual Savings = **$75,920** Potential Lifetime Svgs (5 yr) = **$273,324** Simple payback = **1.1 years**
Roxbury CC	Membership to IRN and new can & bottle recycling in dorms	**$2,000**		
Mt Wachusett CC	Can & bottle recycling in dorms	**$5,000**		
Westfield SC	Compactor for mixed paper and cardboard recycling	**$15,661**		
Fitchburg SC	Compactor for mixed paper and cardboard recycling	**$15,661**		
Framingham SC	New can & bottle recycling in dorms	**$8,000**		
Springfield Tech CC	Compactor & bins for mixed paper and cardboard recycling	**$17,800**		
Mass Bay CC	Compactor for mixed paper and cardboard recycling	**$15,661**		
Salem State College	Recycling bins for mixed paper recycling in offices	**$3,640**		
Summary		**$84,173**	Increased by **760 tons**	**$273,324 lifetime**

2.2 Recycling at the Department of Correction (FY02 - FY04)

The Department of Correction (DOC) implemented an agency-wide mixed paper, cardboard, and metal recycling program for 18 correctional facilities located across the state, with the help of consulting services hired by EOEA to design and assist in implementation of the program. EOEA also funded the purchase of two large compactors, hampers, recycling bins, and other necessary materials needed to implement the recycling program, as recommended by the consultants. Funding for the DOC recycling program was provided in FY02, the program was implemented in FY03, and the first full year of results are available for FY04.

Recycling at DOC in FY04

Diverted =
1,275 tons material
25% Recycling Rate

$ FY04 $ Savings =
$126,241

Simple Payback =
.8 years

Cost: $100,250 (for consulting services and equipment)
$ Savings **$126,241** actual $ savings in FY04
Benefit: DOC recycling program resulted in the diversion of **1,275 tons** of material in FY04, reaching approximately a **25% recycling** rate agency-wide.

2.3 Recycling and Waste Reduction Statewide Campaigns (FY03 & FY04)

Working with the Environmentally Preferable Purchasing Program (EPP Program) at the Operational Services Division, EOEA initiated "statewide campaigns" for Recycling and Waste Reduction to help agencies implement the simple, low-cost, universal "action step" recommendations included in the Agency Sustainability Implementation Guide. Agency staff were offered the opportunity to apply for small-scale recycling and waste reduction equipment such as paper recycling bins and duplex printer units.

Participating Agencies

- Dept of Conservation & Recreation
- Dept of Social Services
- Dept of Telecomm. & Energy
- Dept of Public Health
- Dept of Mental Retardation
- Chelsea Soldiers' Home

Summary of Costs and Potential Benefits

Campaign	Equipment/Materials	Cost	Estimated Enviro & Economic Benefits
Duplex Printing	20 Duplex Printer cartridges at 7 participating agencies DEP duplex printing outreach campaign	$7,200	Estimated **10-30% Reduction** in paper use DEP goal of **50% participation** rate for duplex $ Potential **cost savings** from reduced paper use
Paper Recycling	At 4 participating agencies: • 700 desk-side recycling bins • 14 Slim Jim recycling bins • 11 64 gallon recycling totes	$2,503	Expanded **paper recycling** programs $ Potential for **reduced solid waste costs** through recycling
TOTALS		$9,703	Reduction in paper use Increase in paper and can & bottle recycling $ $ Savings from decreased paper use and increased paper recycling

2.4 Can & Bottle Recycling at State Offices in Boston (FY03 & FY04)

The EOEA State Sustainability Program set up a no-cost can & bottle recycling program at four of the largest state office buildings in Boston, the McCormack Building, the Saltonstall Building, the State House, and 251 Causeway Street, working with the Waverly Redemption Center, a non-profit organization run by the Department of Mental Retardation (DMR) FLOW Program (Fernald League Opportunity Workshops Inc.).

The FLOW program uses revenue from deposit cans & bottles to provide jobs for clients living at the DMR Fernald State School. EOEA also purchased "Slim Jim" style can & bottle recycling bins for each office building, to help reduce contamination of the materials with trash and other non-beverage container items. (Note – the State House can & bottle recycling program was discontinued due to high levels of contamination in recycling bins).

Cost: $2,340 for 52 Slim Jim Recycling Bins
Benefit: **No Cost Can & Bottle Recycling Programs** at four of the largest state office buildings in the Boston area, servicing thousands of employees, and provides jobs for Fernald School residents.

2.5 Mixed Paper Recycling at the Jamaica Plain State Lab (FY04)

EOEA conducted a site visit at a state laboratory facility in Jamaica Plain to help the facility increase recycling and reduce solid waste costs. Based on the recommendations in the site visit report the JP Lab applied to EOEA for the purchase of a small compactor and recycling toters in order to expand their current recycling program from white paper to mixed paper and cardboard recycling.

Cost: $5,800 for compactor and other recycling equipment
Benefit: The JP lab may save up to **$2,500 per year** on solid waste costs and increase their yearly recycling by **19 tons** of mixed paper and cardboard.

2.6 Mixed Paper Recycling at the MWRA Chelsea Facility (FY04)

DEP contracted with WasteCap of Massachusetts to conduct a recycling site visit at the MWRA facility in Chelsea, MA and write a follow-up report of recommendations. Based on the recommendations in the report, the MWRA applied to EOEA for funding to purchase the materials needed to initiate a mixed paper recycling program at the facility, 600 blue bin under-desk recycling bins and eleven 64 gallon totes for recycling collection.

Cost: $2,100
Benefit: Mixed paper recycling throughout the facility.

2.7 DEP Paper and Postage Reduction Initiative (FY03 & FY04)

EOEA funded the purchase of a SmartMailer Software package, and training for agency staff on using the software, for Department of Environmental Protection (DEP) to expand their Paper & Postage Reduction Initiative. The goal of the initiative is to reduce DEP's paper and postage use by 15% by eliminating duplicate or undeliverable addresses and performing postal coding and presorting to achieve the lowest possible postal rate and reduced paper usage.

EOEA also provided funding for DEP to expand their Duplex Printing Campaign by providing marketing and outreach materials to encourage agency staff to set their computers to default double-sided printing. DEP's goal is to have 25% of the agencies staff set their computers to default double-sided printing.

Cost: $12,337 (FY03 and FY04)
Benefit: DEP saved **$1,027** in postage savings alone in the first three months of using the SmartMailer Program, and expects to save at least **$4,108** per year, in addition to reductions in paper use and staff time. The Duplex Printing Campaign will also reduce agency paper use, and will serve as a model for other office-based agencies looking to expand double-sided printing among staff.

2.8 Expansion of UMass Lowell Vermicomposting Program (FY03)

EOEA funded the purchase and installation of a greenhouse structure at the Compost Education and Demonstration Site at UMass Lowell, which will allow the university to expand a pilot organics vermin-composting program to include yard waste, non-recyclable cardboard, and food waste generated on campus year round.

Cost: $5,800
Benefit: UML estimates that the university could save $20,000-$50,000 annually through the diversion of food wastes, cardboard, and leaf and yard wastes generated on campus, although specific projected cost savings are not available at this time.

3. Water Conservation Projects

3.1 Waterless Urinals at UMass Medical School (FY04)

The UMass Medical School received funding to replace two traditional urinals with waterless urinals in a bathroom facility at the hospital. The waterless urinal system chosen eliminates water usage, reduces water and sewer costs, and reduces maintenance time needed to clean and maintain the urinals, as compared to traditional urinal design.

Cost: $999

Benefit: Based on an average urinal use per day calculation, installing two waterless urinals could save UMM up to **46,400 gallons** of water and between **$280** in water costs, per year.

3.2 Water Conserving Showers at a State Park (FY04)

EOEA funded the purchase of 12 coin-operated shower control systems, which operate up to 4 showers each, for the bathhouses at the Department of Conservation and Recreation (DCR) Harold Parker State Park, in North Andover, MA. The control systems will automatically shut-off after an allotted amount of time (generally 3-5 minutes, depending on settings), conserving water and saving money on water and sewer costs, and reducing energy costs for hot water.

Cost: $10,000

Benefit: Based on a case study in CA, reducing the average shower time from 10 minutes to 3 minutes could result in **1.3 million gallons** of water saved per year, over 6.8 million gallons saved over a five year period. DCR will see savings in both water and sewer costs and energy costs (hot water), by reducing overall water use from showers at the park.

3.3 Green Landscaping at Department of Public Health (DPH) (FY04)

DPH designed and constructed a small area of green landscaping as an accessory to a new parking area needed at the Mass Hospital School in Canton, MA. The 80' by 10' landscaped area is made up of a gravel buffer zone (also 80' by 10'), permeable soil, and native shrubs and perennials that are salt tolerant, low-maintenance, attractive, and suited to the site's microclimate.

Cost: **$10,000**

Benefit: The landscaped area provides stormwater treatment for the new parking lot per small Municipal Separate Storm Sewer System (MS4) requirements, and is an educational resource for staff and residents.

3.4 Efficient Washing Machines at Chelsea Soldiers' Home (FY03)

Chelsea Soldiers' Home received funding to replace four older clothes washing machines with water and energy conserving models, and is developing a plan for phasing out their remaining machines.

Cost: **$5,980**

Benefit: Reduction of **146,000 gallons** of water per year, and cost savings of **$1,460** per year, an estimated 4 year simple payback on the initial investment. Efficient clothes washing machines also reduce energy costs by reducing the volume of water that requires heating.

4. Other Innovative Pilot Projects

EOEA also provided funding to agencies for specific, agency-initiated pilot projects to test new technologies or operational practices. The results of these pilot projects provides the necessary "real-life" evidence that these new technologies are effective, while reducing the agency's impact on the environment as well as saving money.

4.1 EPP Cleaners - Indoor Air Quality Testing (FY03)

EOEA provided funding to the MA Environmentally Preferable Purchasing (EPP) Program to assess the indoor air quality (IAQ) benefits of replacing conventional floor care systems (floor finishes and strippers) with environmentally preferable "green" ones at the Lemuel Shattuck State Hospital in Jamaica Plain. The intent of the project was to identify if there were any additional chemical components in the products that were not listed on the Material Safety Data Sheets, and to measure the rates at which conventional and green products emit volatile organic compounds (VOCs), a major contributor to IAQ problems. In addition to the side-by-side chemical tests, the EPP Program performed a cost comparison of a wide range of "green" cleaning products to their conventional counterparts available from the Industrial/Commercial Supplies statewide contract.

Cost: $10,550
Benefit: Lower VOC emission rates of environmentally preferable floor care systems were documented, and pricing was determined to be comparable, and sometimes lower, than conventional floor finishes and strippers (for more information please see the complete report on EPP website at http://www.mass.gov/epp/enviro.htm

4.2 Arsenic Encapsulation on Pressure Treated Wood (FY04)

EOEA provided funding for DCR to test the use of a new product for the encapsulation of arsenic on pressure treated wooden playground equipment, boardwalk areas, and outdoor showers at Salisbury Beach State Reservation. Pressure treated wood often contains arsenic, a known carcinogen, and the best management practice is to seal any public access area made of pressure treated wood at least once a year to prevent exposure.

The encapsulation product tested by DCR is solvent free, and is designed to last for 7-10 years, as compared to more traditional sealants that must be re-applied each year. DCR tested the wood and surrounding areas for traces of arsenic before and after use of the encapsulation material, and will continue to monitor the site to determine the long-term feasibility of the coating, and the potential to use on other pressure treated wood products.

Cost: $10,212
Benefit: DCR is currently reviewing and analyzing the initial results of the testing and will continue to monitor the durability of the product over time. The agency intends to use the data collected to help make informed decisions for dealing with pressure-treated wood to eliminate or minimize to the greatest extent possible the exposure to toxic chemicals at all state parks.

4.3 Tire Chip Leachate Testing (FY04)

Used tires are an increasingly difficult and expensive waste to manage, with serious environmental and human health impacts from illegal disposal or uncontrolled burning. In 2002 the Department of Environmental Protection worked with the University of Massachusetts, Dartmouth to test the use of tire chips in septic systems as an alternative to gravel in the leaching field. Tire chips were installed next to a conventional stone-aggregate trench in order to compare to standard technologies.

This year, after two years of monitoring, DEP received funding from EOEA to unearth a small section of both the tire chip and the stone trenches in order to observe the condition of the tire chips and determine the success of using the material in place of gravel in septic systems.

Cost: $1500 (final testing only):
Benefit: The results from the final testing of this pilot project have provided scientific evidence that meets DEP criteria for permitting alternative systems or components of septic systems. Once issued, this permit will provide a beneficial use for millions of tires in Massachusetts, reducing the potential health and environmental risks from incineration and other disposal options, at a potentially lower over-all cost.

4.4 LEED Certification Training (FY03)

EOEA provided funding for UMass Amherst to host a LEED (Leadership in Energy and Environmental Design) certification course for twenty campus staff. EOEA also provided funding for five employees from the Division of Capital Asset Management (DCAM) and the Department of Housing and Community Development to attend a LEED certification course.

Cost: **$8,925**
Benefit: LEED training sessions provide the fundamental instruction needed to become proficient in LEED certification, and help prepare engineers, architects, project managers, facility managers and other related staff for taking the LEED accreditation exam.

4.5 Public Employee Thermometer Exchange (FY02)

In June of 2002 EOEA and DEP sponsored a thermometer exchange for Massachusetts State Employees to encourage state employees to turn in their mercury containing thermometers in exchange for a free digital thermometer. Thermometer exchange events were held at 9 different state office facilities located throughout the Boston area.

Cost: DEP supplied the digital thermometers as part of a statewide exchange program, and EOEA paid the minimal cost of proper disposal (approximately $200).
Benefit: 546 mercury-containing thermometers were collected and properly disposed of, removing between 273 and 546 grams of mercury from the solid waste stream.

4.6 Outboard Motor Policy and Pilot Projects (FY02)

Working with the Coastal Zone Management office EOEA established a “Clean Outboard Motor Policy “ in 2002 to ensure that all new outboard motors purchased by EOEA agencies are direct fuel injected or four-stroke technology. These technologies use less gasoline and oil and reduce air and water pollution by up to 30%, as compared to traditional two-stroke outboard motors. EOEA provided funding for agencies to replace 3 existing engines with 4-stroke engines.

Cost:	$6,228
Benefit:	Four-stroke outboard boat motors use less gasoline and reduce air and water pollution by up to 30%, as compared to traditional two-stroke outboard motors.

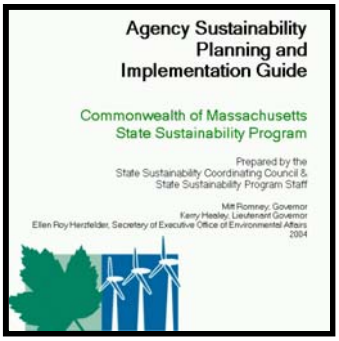
Section II. Statewide Activities

In addition to working with agencies on specific sustainability projects, EOEA State Sustainability staff worked to provide guidance, training, and other assistance to state agencies, to assist in planning for and implementing sustainable practices into their operations. This Section outlines these major initiatives.

1. Agency Sustainability Guide

Background & Goal

The *Agency Sustainability Planning & Implementation Guide* (Guide) was prepared to help agencies understand the environmental and public health impacts of their day-to-day decisions and actions, set statewide goals for sustainability, and to provide agencies with specific actions they can take to initiate sustainability efforts.



The Guide was written and prepared by the eight inter-agency topic committees of the State Sustainability Council and State Sustainability Program Staff.

Project Overview

The Guide was released in May of 2004, and consists of three primary sections:

1. **Introduction and Background** – information on environmental issues of concern, sustainability principles and the rationale for establishing a state sustainability program.
2. **Sustainability Area Program Guidance** – eight sections describing specific environmental impacts and issues associated with human activity, long-term goals for state government, and specific strategies and action steps that agencies should take to achieve state goals.
3. **Agency Sustainability Planning** – a step-by-step guide to help agencies initiate and manage sustainability plans and implement internal sustainability programs.

A copy of the Agency Sustainability Planning & Implementation Guide was given to each member of the State Sustainability Council, and is available on the EOEA State Sustainability website at http://mass.gov/envir/Sustainable. The Guide will be distributed to each agency head in conjunction with a copy of the Massachusetts Climate Protection Plan in December of 2004.

Cost

The *State Sustainability Planning and Implementation Guide* was written and designed in-house at no additional cost to the agency. Partial printing costs for the first 300 copies were provided by the Office for Commonwealth Development & Massachusetts Renewable Energy Trust Partnership, in conjunction with the release of the Massachusetts Climate Protection Plan.

EOEA Printing & Material Costs: $3,396

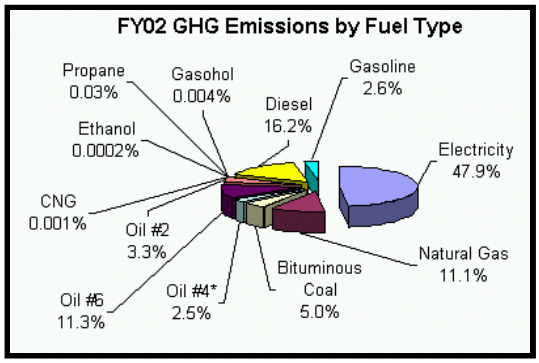
2. FY02 GHG Inventory for State Agencies

Background & Goal

To assess the environmental impacts of agency operations and measure progress in targeted areas, the State Sustainability Program compiles operational data from central purchasing records and agency responses to the *Agency Tracking and Reporting Form*. On an annual basis the State Sustainability Program attempts to track consumption of energy, water, vehicle fuels, solid waste generation, as well as other operational and environmental data.

The Program's first priority was to compile energy consumption data for all state agencies, in order to calculate a fiscal year 2002 greenhouse gas inventory for state agencies. EOEA, with assistance from the Operational Services Division and Division of Energy Resources, compiled the following data, and used standard conversion factors to calculate the carbon dioxide equivalents for each fuel source:

- Electricity consumption
- Natural gas consumption
- Building fuel oils (#2,4,6)
- Vehicle fuels (gasoline, diesel, propane, CNG, ethanol)



EOEA State Sustainability staff are also working to compile baselines for water consumption and waste disposal for fiscal year 2004, but data is not yet available for all agencies.

Project Overview

EOEA released the *FY02 Massachusetts Greenhouse Gas Inventory for State Agencies* in February of 2004. In FY02 Massachusetts state agencies were responsible for **1.36 metric tons** of carbon dioxide emissions (CO_2), equivalent to the emissions of **226,552 average cars** on the road for a year.

- Electricity and fuel for buildings accounted for 68.8% of the emissions, while public transportation accounted for 27%, and other agency transportation (vehicles) 4.3%
- Public colleges and universities accounted for 30% of state government emissions
- Executive agencies account for approximately 28% of state government emissions

Cost

The *FY02 Massachusetts Greenhouse Gas Inventory for State Agencies* was compiled, calculated, and written in-house at no additional cost to the agency.
EOEA Printing Costs: $133

Benefit

The State Agency FY02 Greenhouse Gas Inventory will be used as a baseline by which we can measure our progress toward the goal to reduce state government emissions by 25% by 2012, as established in the *New England Governors and Eastern Canadian Premiers Climate Change Action Pla*n, the *Massachusetts Climate Protection Plan*, and the *Agency Sustainability Planning and Implementation Guide*.

3. Planning Assistance for Agencies

Background & Goal

The State Sustainability Executive Order, E.O. No. 438, requires state agencies to write Agency Sustainability Plans outlining agency environmental impacts, long-term goals for sustainability, and a short-term work plan for reaching these goals. Recognizing that agencies will need guidance in organizing and writing these plans, EOEA developed an Agency Sustainability Plan Template to help guide agencies in organizing and writing the plans. EOEA also hired consultants to work directly with five agencies to develop and write their plans earlier than the February 2005 deadline, to be available as model plans for other agencies.

Project Overview

EOEA provided plan writing assistance for 5 agencies from different Executive Offices in the Commonwealth, in order to develop a diverse group of model plans for other agencies to follow. These agencies included:

1. **Department of Conservation and Recreation** (E.O. of Environmental Affairs)
2. **Bridgewater State College** (Board of Higher Education)
3. **Mass Highway Department** (E.O. of Transportation)
4. **Registry of Motor Vehicles** (E.O. of Administration and Finance)
5. **Chelsea Soldiers' Home** (E.O. of Health and Human Services)

Consultants provided assistance to each of these five agencies by facilitating a kick-off Sustainability Team workshop, assisting in identifying goals, short-term actions, and agency environmental impacts, and in structuring, writing and editing the plan drafts.

As of December 2004 the following Agency Sustainability Plans have been completed and are posted on the EOEA website at http://www.mass.gov/envir/Sustainability

- Department of Conservation and Recreation (DCR)
- Springfield Technical Community College (STCC)
- Massachusetts Maritime Academy (MMA)
- Massachusetts Port Authority (MMA)
- Registry of Motor Vehicles (RMV)

Cost

Consulting Services: $23,500

Benefits

Working with several agencies to finish their Sustainability Plans ahead of the deadline for plan submission allowed EOEA to post several "model" Sustainability Plans, from a variety of agencies, on an accessible website for other agencies to review as they begin working on their own plans.

4. Workshops and Trainings

4.1 Sustainability Spring Training, May 2004

The Sustainability Program team held a training session in May of 2004 at UMass Lowell to introduce the recently completed *Agency Sustainability Planning and Implementation Guide* to Agency Coordinators, and to provide guidance for agency staff as they begin working on Agency Sustainability Plans.

The one-day training session was intended to provide the following information to Agency Sustainability Coordinators and staff who will be participating in the sustainability planning process:

- The basics of sustainability - through the life cycle lens
- Background on the State Sustainability Program, goals, resources, and initiatives
- How sustainability relates to individual job functions
- How to write a sustainability plan and what elements and ideas should be included
- Who in other agencies are facing similar challenges – networking opportunities

The spring training workshop drew 76 staff from 26 agencies and 14 state and community colleges. Please see the Sustainability Spring Training Summary Report, posted on the EOEA website, for additional details on the workshop.

Cost:

Trainer Services and incidentals: $11,181

4.2 State Sustainability Overview Workshop, June 2003

EOEA held a ½ day training session for Agency Sustainability Coordinators in June of 2003 in Boston, MA, to introduce the basics of sustainability, and to ensure agency staff were familiar with the Massachusetts State Sustainability Program and associated resources.

Cost:

Trainer Services and incidentals: $3,870

4.3 Compliance Awareness Training, June 2002

EOEA planned and held an awareness-level environmental compliance training in June 2002 in Boxborough, MA targeted towards EH&S Managers, Facility Managers and construction and maintenance field personnel who may be exposed to or come in contact with environmental regulatory issues. One hundred and eleven staff representing 20 different agencies and colleges attended the compliance training. (FY02)

Cost:

Trainer Services and incidentals: $12,960

Appendix I: Summary of Projects and Activities

Summary of State Sustainability Agency Projects

Greenhouse Gas Emissions/Energy Efficiency

- Identified appropriate facilities, and coordinated and funded cost-saving electricity retrofits at 9 facilities in 3 agencies.
- Identified pilot locations and funded the purchase and installation of 91 energy misers on vending machines at 6 agencies.
- Distributed 361 screw-in compact fluorescent bulbs to replace incandescent bulbs at 4 agencies, as part of a statewide energy reduction campaign.
- Worked with Salem State College to replace 28 old exit signs with energy efficient LED alternatives.

Waste Reduction & Recycling

- Hired consultants to conduct solid waste management site visits at 14 state and community college campuses and 4 state agency facilities, resulting in comprehensive recommendations on ways to reduce costs and increase recycling.
- Coordinated with 8 college campuses to implement recommendations from site visit reports, and provided funding for large-scale equipment and recycling bins.
- Assisted the MWRA Chelsea facility in implementing site visit recommendations for a new paper and cardboard recycling program and provided funding for recycling equipment.
- Completed a solid waste site visit at a UMass Medical Center Lab and wrote a recycling recommendation report, worked with the lab to implement recommendations, and provided funding for a cardboard baler and recycling bins for the facility.
- Distributed 714 recycling bins to 4 agencies, as part of a campaign to provide small-scale recycling bins to state facilities, looking to increase paper recycling.
- Worked to promote double-side printing in state offices, and provided funding for 20 duplex printer units for 7 agencies.
- Funded the purchase of an outdoor greenhouse to allow for year-round composting at UMass Lowell, enhancing the UMass Lowell Vermi-composting project.
- Researched, identified, and set up a no-cost can & bottle recycling program for the State House, the McCormack Building, 251 Causeway Street, and the Saltonstall building, and provided funding for 52 Slim Jim style recycling bins.
- Provided funding to DEP for a double-sided printing educational campaign, and additional SmartMailer software and training, to further the DEP “Paper and Postage Reduction” project.
- Worked with a consultant to develop an agency-wide recycling program for all Department of Correction facilities. Provided funding for compactors and recycling bins to kick-off the program.

Water Conservation

- Identified a new waterless urinal technology and an appropriate pilot site, the UMass Medical Center, and funded the purchase and installation of 2 urinals to test the technology.
- Funded the purchase of 12 coin-operated shower controllers, which can be used to control up to 4 showers each, to reduce water use at the DCR Harold Parker State Forest in North Andover, MA.
- Worked with DPH to plan and implement a “green landscaping” pilot project, to reduce the environmental impacts of a new parking lot at the Mass Hospital School.
- Funded the purchase of 4 water efficient washing machines at the Chelsea Soldier’s Home, to replace older inefficient models.

Toxics

- Provided funding to DCR for the application and testing of new sealant for pressure-treated wood products, designed to reduce the risk of arsenic exposure, tested on playground equipment at Salisbury Beach State Reservation.
- Provided funding to DEP to complete follow-up testing for a 2-year old pilot project testing the use of waste tires as septic leachate material.
- Provided funding to OSD to complete an air quality testing project, to determine the impacts of using non-toxic cleaning products.
- Coordinated a thermometer exchange for state government employees, collecting and properly recycling approximately 273-546 grams of mercury, from 546 mercury-containing thermometers.

Sustainable Design & Construction

- Provided funding for 25 state employees from 4 agencies to attend a LEED (Leadership in Energy and Environmental Design) Certification course. LEED training helps ensure that engineers and project managers understand sustainable design options for state-funded construction and renovation projects, and provides engineers and architects the opportunity to apply for personal LEED Certification.
- Obtained grant from the Mass Technology Collaborative (MTC) to hire a Sustainable Design Research Coordinator, who will coordinate Green Roundtable meetings, and work to overcome barriers to sustainable design in public design and construction projects.

Summary of State Sustainability Statewide Activities

Agency Sustainability Planning & Guidance

- Worked with the Coordinating Council to write and distribute the Agency Sustainability Planning & Implementation Guide.
- Developed a "template" Agency Sustainability Plan, to provide assistance to agencies in planning and writing Sustainability Plans.
- Provided technical assistance to five large agencies to write Agency Sustainability Plans, including the Department of Conservation and Recreation (DCR), Massachusetts Highway Department (MHD), Bridgewater State College, Chelsea Soldiers' Home, and the Registry of Motor Vehicles (RMV).

Tracking and Reporting

- Compiled fiscal year 2002 energy consumption data from over 100 state agencies, converted to carbon dioxide equivalents, and completed the FY02 Greenhouse Gas Inventory for State Agencies report.
- Set FY02 statewide energy baselines for electricity, natural gas, fuel oils, gasoline, and diesel fuel.

Training and Educational Materials

- Planned and held a training in May 2004 on planning for sustainability and writing Agency Sustainability Plans, attended by 76 staff from 26 agencies and 14 state and community colleges.
- Planned and held a training in June 2003 for Agency Sustainability Coordinators providing information on the basics of sustainability principles and the State Sustainability Program.
- Planned and held an awareness-level environmental compliance training in June 2002, targeted towards EH&S Managers, Facility Managers and construction and maintenance field personnel who may be exposed to or come in contact with environmental regulatory issues.
- Developed a Mercury Fact sheet to provide targeted educational materials and information on mercury issues for state employees.
- Developed two Sustainable Design Fact Sheets, one targeted towards schools in Massachusetts, and another targeted to state agency employees.

Appendix II: Calculations and Sources

Project Specific Sources:

Energy Audits

Cost Savings and kWh reductions from energy retrofits included in this report have been estimated by professional energy auditing firms who conducted site visits at each facility.

College Recycling Programs

Potential cost savings and increases in recycling at college campuses included in this report were taken from site visit reports complete by a professional recycling consultant.
Site visit reports are available on EOEA's website at:
http://www.mass.gov/envir/Sustainable/reports/recycle/higher_ed.htm

DOC Recycling Projects

Cost savings and increases in recycling at DOC are based on actual data measured by the agency in FY2004.

Estimated Cost Savings and Environmental Benefits of Specific Products

Vending Misers

Source: USA Technologies, "Vending Miser Custom Savings Analysis" calculator
Web: http://www.usatech.com/energy/analysis.php

Compact Fluorescent Lamps (CFL)

Source: US EPA "Life Cycle Cost Estimate For Compact Fluorescent Lamps" calculator
Web: http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Calc_CFLs.xls

Shower Controls

Source: Water Conservation Services cost benefit analysis, based on a CA case study (adjusted to ½ the number of shower uses per year, based on seasonal usage at MA facilities).
Web: http://www.watercon.com/html/costbenefHTML.html

Waterless Urinals

Source: US Department of Energy (DOE), Federal Energy Management Program (FEMP)
Average annual water use for a typical existing unit = 23,400 gallons
Average water and sewer cost based on UMM FY03 cost = $.006 per gallon
Web: http://www.eere.energy.gov/femp/technologies/eep_urinals.cfm

Environmental Benefit Calculations

Car Equivalents

Factor: 4.62 metric tons CO_2 equivalent per passenger car per year
Source: US EPA, US Climate Technology Cooperation Gateway "GHG Equivalency Calculator Tool"
Web: http://www.usctcgateway.net/tool/

Trees per ton of mixed paper recycled

Factor: 11.8 trees saved per ton of mixed paper recycled
Source: Northeast Recycling Council (NERC) "Facts about Recycling in Massachusetts, 2003"
Web: http://www.nerc.org/fsheets/ma-factsht11-03.html

Mercury in fever thermometers

Factor: approximately .5-1 gram of mercury per thermometer
Source: Northeast Waste Management Officials Association (NEWMOA)
Web: http://www.newmoa.org/Newmoa/htdocs/prevention/topichub/subsection.cfm?hub=22&subsec=19&nav=19